ERICAMERIA NAUSEOSA SUBSP. *AMMOPHILA* (ASTERACEAE), A NEW RABBITBRUSH FROM THE SAN LUIS VALLEY OF COLORADO

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ABSTRACT

A previously undescribed, distinctive subspecies of rabbitbrush has been recently discovered in south-central Colorado where it is the dominant plant on sandsheet and is frequent on low sand dunes. It is here named *Ericameria nauseosa* subsp. *ammophila*. A detailed description is given. Comparisons are made with related taxa, and a key is provided.

RESUMEN

Se ha descubierto recientemente una nueva subespecie de chamiso en el centro-sur de Colorado dinde es la planta dominante en el arenal y frecuente en dunas bajas. Se ha nombrado como *Ericameria nauseosa* subsp. *ammophila*. Se aporta una descripción detallada. Se hacen comparaciones con otros taxa relacionados, y se aporta una clave.

One of the most widespread species in western North America is the rabbitbrush *Ericameria nauseosa* (Pallas ex Pursh) Nesom & Baird. It ranges from southern Canada south to northern Mexico and from the Dakotas, Kansas, and Texas west to Washington and California. This rabbitbrush was long known as *Chrysothamnus nauseosus* (Pallas ex Pursh) Britton. H.M. Hall (with F. E. Clements) monographed *Chrysothamnus* in 1923 and *Haplopappus* in 1928, and his views held for many years. However, when the North American species of *Haplopappus* were demonstrated not to be closely related to the South American species (which included the type species for the genus), several sections of Hall's North American *Haplopappus* were recognized as separate genera. One such genus is *Ericameria*. Some species of *Chrysothamnus*, such as *C. nauseosus*, have long been noted for their close similarity to *Ericameria*. When DNA data suggested that the traditional *Chrysothamnus* was not monophyletic, Nesom and Baird (1993) transferred four of its species, including *C. nauseosus*, to *Ericameria*.

Anderson (1986a) recognized 22 subspecies of *C. nauseosus*, whereas Nesom and Baird (1993) recognized two subspecies of *E. nauseosa* (i.e., subsp. *nauseosa* and subsp. *consimilis*) and several varieties. Now, a new infraspecific taxon of *E. nauseosa* is to be described. Should it be a variety or a subspecies? Nesom and Baird (1993) emphasized the category of variety, but I believe my rationale for use of subspecies (Anderson 1986b) is solid, and I therefore describe the new subspecies, *Ericameria nauseosa* subsp. *ammophila*, below. Variability in the species is great, and my extensive study of the group in the field and in the herbarium has convinced me to apply infraspecific names to only the more significant morphotypes. It is surprising that this new subspecies has escaped recognition for so long. Specimens of it were not represented in the more than 12,000 collections of *C. nauseosus* that I studied from 56 herbaria (including COLO, CS, NCM, RM, and UNM) about 30 years ago.

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I intend to make appropriate subspecific combinations in *Ericameria nauseosa* in a future paper so that variation within the wider ranging subspecies can then be recognized through quadrinomials. Some argue that quadrinomials are cumbersome, but at an applied level, some field workers may wonder why the populations in their regions have the same subspecific name that is applied to somewhat different-looking populations in other regions, and quadrinomials would help them see the relationships. Therefore, in the discussion section of the present paper, I will use subspecies names as they occurred in *Chrysothamnus nauseosus* (Anderson 1986a) for comparative purposes.

Ericameria nauseosa (Pallas ex Pursh) Nesom & Baird subsp. **ammophila** L.C. Anderson, subsp. nov. (**Figs. 1, 2**). TYPE: UNITED STATES. COLORADO. Saguache Co.: abundant on sandsheet of Baca National Wildlife Refuge, ca. 4.5 air mi SW of Crestone, elev. 2528 m (7600 ft), Lat. 37° 56' 12" N, Long. 105° 44' 29" W, 2 Sep 2005, *L.C. Anderson 21,303* (HOLOTYPE: BRIT; ISOTYPES: COLO, FSU, NY).

Frutices usque ad 14 dm alti caulibus multis fastigiatis tomentulosis et foliis flavovirentibus; folia linearia, 20–45 mm longa, 0.6–1.2 mm lata; inflorescentiae paniculatim cymosae; capitula cylindrica, 9.3–14 mm alta, straminea, bracteis exterioribus ovatis, tomentulosis vel glabratis, interioribus oblongis, glabris, apicibus obtusis vel acuminatis; flosculi disci 5, pallide flavi, corollibus 10.5–13 mm longis, lobis plerumque minus quam 1 mm longis, aliquot pilis sparsis in tubo corollae usque ad 3.5 mm longis, appendicibus styli quam lineis stigmaticis plerumque longioribus, plerumque longioribus; achaenia pubescentia.

Fastigiate shrubs, 3.5–7(–14) dm tall, usually broader than tall from considerable branching; ultimate flowering branches (8–)10–20(–25) cm tall, shallowly grooved, yellowish-green with compact tomentum, somewhat viscidulous. Leaves alternate, entire, linear, stiffly ascending or slightly spreading, (20–)25–30(–45) mm long, only slightly shorter toward stem tips, (0.6–)0.9–1.0(–1.2) mm wide, subterete with adaxial groove, light green, pubescence of sparse, compact, tomentum and a few longer, villous hairs. Inflorescences tightly congested paniculate cymes; heads cylindrical, (9.3–)11–12.5(–14) mm tall, (2–)2.5(–3) mm wide, stramineous; receptacle with central cusp (0.7–)1–2(–2.5) mm long. Phyllaries (15–)16–18(–20), in vertical rows, outermost (lowest) bracts ovate, 1.2–2 mm long, tomentulose to glabrate, inner bracts oblong, 8–10 mm long, glabrous with ± ciliate margins (few cilia to 0.4 mm long), weakly keeled, tips (rarely with tufted pappilae 0.1 mm long) obtuse to acuminate. Disk flowers 5; corollas (10.5–)11.5–12.5(–13) mm long, narrowly cylindric gradually flaring to erect lobes (0.6–)0.7–1.0(–1.3) mm long, yellow, sparse hairs on tube generally 0.2 mm long but a few 1–2(–3.5) mm long; styles (13–)14–16(–17.5) mm long, style branches 3.9-4.7 mm long, the stigmatic lines more or less equal to branch tips in length (40–56%), anthers 4 mm long with appendage 0.8–0.9 mm long; mature achenes cylindric, 5-nerved (the nerves when noticeable because of brownish material in associated secretory canals), 4.5–6(–6.8) mm long, sericious with hairs (0.4–)0.5–0.7(–1.0) mm long, pappus (9–)10–11(–12.5) mm long, finely barbellate, white.

Phenology.—A few shrubs of the new subspecies start to bloom in late August; most are in full bloom in mid-late September, whereas *E. nauseosa* subsp. *consimilis*, or var. *oreophila* (A. Nelson) G.L. Nesom & G.I. Baird, found in nearby more mesic, saline sites, blooms earlier in August.

Habitat.—The new rabbitbrush occurs (in descending frequency) on: sandsheet, dune fields, stabilized sand dunes, and sandy soil of open pinyon-juniper (old dunes?). The term sandsheet is variously defined by geologists; here it refers to flat expanses of stabilized coarse, poorly sorted sands that occur extensively along the margins of the high dunes of the Great Sand Dunes National Park (tallest in North America). The rabbitbrush is the dominant plant (hiding nearly equally frequent grasses) on the sandsheet, and sandsheet

FIG. 1. Close-up of of flowering branches of *Ericameria nausosa* subsp. *ammophila* showing characteristic yellowish-green stems, nearly glabrous involucres, and short corolla lobes.

rabbitbrush is very appropriate as a common name for this new subspecies (whose epithet *ammophila* means 'sand loving'). From a distance, the vegetation on much of the Baca National Wildlife Refuge appears as a more or less evenly spaced, 'unbroken sea' of sandsheet rabbitbrush. Dune fields are generally flat but have some undulating topography. The sandsheet rabbitbrush occurs at elevations from 2518 to 2735 m (7550 to 8200 ft).

Associated species.—The grasses, *Achnatherum* (*Oryzopsis*) *hymenoides* (Roem. & Schult.) Barkworth and *Chondrosum* (*Bouteloua*) *gracile* H.B.K., are usually co-dominants with the sandsheet rabbitbrush. The following are found at one or more sites: *Chrysothamnus greenei* (Gray) Greene, *Eriogonum cernuum* Nuttall, *Heterostipa* (*Stipa*) *comata* (Trin. & Rupr.) Barkworth, *Ipomopsis longiflora* (Torr.) V. Grant, *Nuttallia* (*Mentzelia*) *rusbyi* (Wooton) Rydb., *Opuntia polyacantha* Haworth, *Psoralidium lanceolatum* (Pursh) Rydb., *Rhus trilobata* Nuttall, *Senecio multilobatus* Torr. & Gray, *Sporobolus cryptandrus* (Torr.) Gray, and *Yucca glauca* Nuttall. The flora of the sandsheet-sandhill ecosystem of this region is sparse in numbers of taxa.

Additional collections: **COLORADO. Alamosa Co.:** Great Sand Dunes National Park Visitor's Center, 2 Sep 2005, *L.C. Anderson 21,280* (FSU); sand sheet by road to Medano Ranch, 9.9 mi E of Hwy 17, 2 Sep 2005, *L.C. Anderson 21,291* (FSU). **Saguache Co.:** ca. 3.7 mi SSE of Crestone, 21 Aug 2001, *J. Erdman 0113* (FSU), 6 Sep 2001, *J. Erdman 0116* (FSU), 27 Sep 2001, *J. Erdman 0121* (FSU); 1 Sep 2005, *L.C. Anderson 21,276* (FSU); rd to San Isabel Canyon trailhead, 21 Aug 2001, *J. Erdman 0114* (FSU); 7 Sep 2001, *J. Erdman 0119* (FSU); 28 Sep 2001, *J. Erdman 0123* (FSU); near Pinyon Flats, Great Sand Dunes National Park, 2 Sep 2005, *L.C. Anderson 21,286* (FSU); dune field near "Oxbow Pond" between Spanish Creek and Cottonwood Creek, 22 Aug 2001, *J. Erdman 0115* (FSU); 7 Sep 2005, *J. Erdman 0118* (FSU); 27 Sep 2001, *J. Erdman 0122* (FSU); 2 Sep 2005, *L.C. Anderson 21,301* (FSU).

DISCUSSION

The sandsheet rabbitbrush (subsp. *ammophila*) is perhaps most closely related to subsp. *nitidus* L.C. Anderson which occurs in northern Arizona and adjacent New Mexico. The two share the features of yellow-green foliage and stramineous, shiny involucres. They differ in geography and habitat (subsp. *nitidus* prefers sandy gravels of dry stream beds) and in that subsp. *ammophila* fomrs shorter shrubs usually 35–70 cm tall (60–150 cm in subsp. *nitidus*), and has flowering stems fastigiate and more crowded than in subsp. *nitidus*, leaves usually 25–30 mm long and 1 mm or less wide (30–50 by 1–1.5 mm in subsp. *nitidus*), corollas mostly 11.5–12.5 mm long (9.5–11 mm in *nitidus*), unusually long trichomes on the corolla tubes and pubescent achenes (usually glabrous in *nitidus*). Subspecies *turbinatus* M.E. Jones is like the sandsheet rabbitbrush in height and branching, but it occurs generally in sandy regions of the Great Basin and has mostly longer involucres with tomentulose phyllaries that are acute to acuminate (phyllaries in subsp. *ammophila* are mostly glabrous with obtuse to acute tips), and shorter corollas with lobes that are villous. Subspecies *consimilis* (i.e., var. *oreophila* of Nesom & Baird 1993) rarely grows with subsp. *ammophila*, but subsp. *consimilis* usually grows in more saline or disturbed (mesic) habitats in this region, and it differs in forming generally taller, narrower shrubs with darker green foliage and smaller involucres and flowers. The unusually long hairs (up to 3.5 mm) on the corolla tubes of the sandsheet rabbitbrush are 10 times longer than any others found in the species or in all of the former genus *Chrysothamnus* (Anderson 1970).

A portion of the Urbatsch et al. (2006) key to the varieties (listed here as subspecies) of *Ericameria nauseosa* is given below with the new subspecies included; subsp. *ammophila* shares a couplet with subsp. *bernardinus*, but the two are not closely related (ecologically, geographically, or taxonomically within the species).

FIG. 2. Sandsheet rabbitbrush in foreground on stabilized dune in Great Sand Dunes National Park (in front of lower shoulder of large dune devoid of vegetation) with the Sangre de Cristo Mountains in the background.

1. Cypselae glabrous (plants 60–150 cm; involucres 10–12.5 mm) _____ subsp. **nitidus** (in part)
1. Cypselae hairy.
   16. Corolla lobes villous (sometimes sparsely).
      19. Leaf blades 30–50 mm, faces glabrate _____ subsp. **nitidus** (in part)
      19. Leaf blades 10-20 mm, faces tomentulose _____ subsp. **turbinatus**
   16. Corollas lobes glabrous.
      23. Phyllaries usually glabrous, outer sometimes sparsely hairy.
         24. Corollas 10–12[13] mm; involucres [9.3]10–14 mm.
            [24a. Corolla lobes 1.7–2.3 mm] _____ subsp. **bernardinus** (in part)
            [24a. Corolla lobes 1 mm or less] _____ subsp. **ammophila**
         24. Corollas 6–9+ mm; involucres 6–10 mm _____ subsp. **consimilis** [i.e., var. **oreophila**]

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